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FOREIGN TECHNOLOGY DIVISION



SOLUBILITY OF WATER IN FREONS

by

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EDITED TRANSLATION

SOLUBILITY OF WATER IN FREONS

By: A. K. Chernyshev

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SOLUBILITY OF WATER IN FREONS

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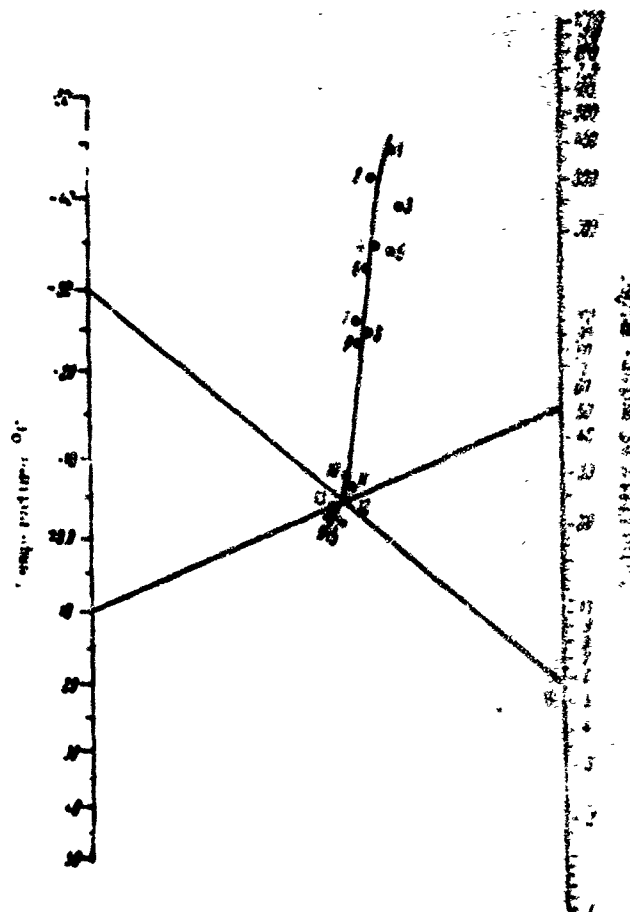
Experimental data on the solubility of water in many Freons are given in the form of diagrams in contemporary reference literature [1-3].

On the basis of generalized experimental data we have constructed a simple nomogram (see figure) which permits rapid and accurate determination of the solubility of water in liquid Freons.

The points are arranged along a curve of a definite shape, which permits us to include that approximate determination of the solubility of water in liquid and vaporous Freons by means of data for the single temperature is possible.

For this purpose a straight line is drawn through points corresponding to known values of temperature and solubility on the left and right axes.

The point at which the straight line intersects the curve gives a nodal point for the given Freon. By drawing straight lines from other values of temperature through this point it is possible to find the solubility under these conditions.



We shall illustrate the use of the nomogram on the example of liquid Freon-11. According to Table 1, in which the points on the nomogram are listed, we find that for the given Freon point 12 is critical. We will draw a straight line through point 12 and through a given temperature (the nomogram shows construction for temperatures of -30° and $+10^{\circ}\text{C}$) up to intersection with the solubility scale. The point of intersection shows the values sought.

Table 1

Cooling point	Solubility of water in Freon, wt.-%	
	liquid	vapor
Freon-11	12	1
-12	10	2
-13	15	3
-21	6	4
-22	5	5
-30	4	6
-40	3	7
-113	11	8
-114	14	9
Sulfur dioxide	2	10

The accuracy in determining the solubility of water in liquid Freons can be judged from the results which are presented in Table 2.

Table 2

Freon	Temp., °C	Solubility of water, g/g		
		in Freon-11	in Freon-21	in Freon-22
R502	-50	—	58.0	—
	-30	5.65	102.0	35.0
	-10	17.00	420.0	120.0
	10	50.00	940.0	330.0
R501	-50	—	50.0	—
	-30	5.60	108.0	30.0
	-10	18.00	420.0	121.0
	10	18.50	920.0	315.0

References

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2. Spravochnik po rastvorimosti (Handbook on solubility). Izd. AN SSSR, 1961-1962.
3. Badyl'kes, I. S. Rabochiye vesnchestva i protsessy kholodil'nykh mashin (Working bodies and processes in refrigerating machines). Gostorgizdat, 1962.

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